PCT/AU00/00834



10/069146

**Patent Office**
**Canberra**

4

I, KAY WARD, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PQ 1580 for a patent by GOODCART PTY LIMITED filed on 12 July 1999.

WITNESS my hand this
Twenty-fourth day of July 2000

K Ward

KAY WARD
TEAM LEADER EXAMINATION
SUPPORT AND SALES

**PRIORITY DOCUMENT**
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

AUSTRALIA

Patents Act 1990

**PROVISIONAL SPECIFICATION**

**Applicant(s):** GOODCART PTY LIMITED

**Invention Title:** SECURITY SCREW

The invention is described in the following statement:

**SECURITY SCREW**

This invention relates to a security screw and has been devised particularly though not solely for the fastening together of components in structures requiring a vandal proof or tamper proof installation.

There are many situations where it is necessary to fasten together components of a structure or apparatus which are to be used in an environment which is susceptible to vandalism or unauthorised tampering. The present security screw has been devised particularly for use in fastening components such as street signs, banner arms and other fittings to roadside poles or other similar installations. It is envisaged however that a security screw of this type has a much wider application such as the fastening of window locks or door locks or in any other situation where a screw type fastener must be secured by an authorised user while yet remaining difficult or impossible to release by an unauthorised user.

In one aspect, the present invention therefore provides a security screw comprising a threaded shank portion and a head portion, the head portion being characterised by having a circular profile about the axis of the shank portion and a smooth crown without any tool engagement slots or recesses.

Preferably the crown of the head portion is substantially flat with a rounded shoulder to the cylindrical periphery of the head portion.

Preferably the security screw is manufactured by the so-called "cold headed" process from a corrosion resistant material such as austenitic stainless steel.

Preferably the screw is manufactured from 316 or 304 stainless steel.

In a further aspect the present invention provides a driving tool for a predetermined security screw of the type comprising a threaded shank portion and a head portion, the head portion of the security screw being characterised by having a circular profile about the axis

of the shank portion and a smooth crown without any tool engagement slots or recesses, the driving tool comprising a shank portion adapted to be rotated by a suitable implement and a cup portion incorporating a recess coaxial with the shank portion, the recess being sized and shaped to fit over the head portion of the screw so as to provide a friction drive between the cup and an engaged screw when the driving tool is rotated by the implement.

Preferably the shank portion of the driving tool is adapted to fit into the chuck of a power drill.

Preferably the recess in the cup portion has a substantially cylindrical wall immediately adjacent the mouth of the recess, an inwardly turned shoulder portion adapted to bear against the shoulder portion between the crown and the circumferential circular profile of the head of the screw, and a base portion which is deeper in the centre than in the peripheral regions, so that the centre of the recess does not bear against a flat crown on the head of the screw.

Preferably at least the cup portion of the driving tool and the head portion of the security screw are manufactured from the same material. Typically the entire driving tool and the entire security screw are manufactured from the same material.

Preferably the material is an austenitic stainless steel such as 316 or 304 stainless steel.

One important embodiment of the invention is one in which the driving tool has a screw engagement portion with an outer circular shape which is substantially of the same diameter as the head portion of the predetermined screw. This embodiment permits a further inventive development to be used namely the combination of a security washer for use with the predetermined screw, the washer having an upstanding collar portion which surrounds the head portion of the screw, thereby preventing access of tools to the peripheral portion of the head portion of the screw.

Thus, a further inventive aspect is a security screw having a head portion and a threaded shank portion, and a complementary washer which fits on the screw and has an upstanding collar portion which, in use, surrounds the head portion to prevent access to the periphery of the head portion with tools for unscrewing the screw, the screw head portion having a circular profile about the axis of the shank portion and a smooth crown without any tool engagement discontinuities such that torque may be applied to the screw through a driving tool having a screw engagement portion the exterior profile of which is circular and substantially of the same diameter as the head portion of the screw and an interior profile which is complementary to a portion of the profile of the smooth crown.

Preferably, the smooth crown has a smoothly rounded shoulder defining an edge surface portion of the crown and the shoulder is adapted to be engaged frictionally by a concave complementary portion of the driving tool.

For good torque transmission characteristics, the material of the screw and driving tool is preferably the same, e.g. stainless steel.

In section the rounded shoulder is preferably part-circular.

For higher security, the washer preferably has an inner edge portion which, in use, extends axially above the top of the crown and the washer is of a hard material to resist cutting of the washer and cutting of the head portion. This increases the resistance to unscrewing with ordinary tools, but the special driving tool can be used to remove the screw.

Notwithstanding any other forms that may fall within its scope, one preferred form of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Fig. 1 is a diagrammatic perspective view of a

security screw and a driving tool according to the invention with the driving tool engaged in the chuck of a power drill;

Fig. 2 is a diagrammatic longitudinal cross section through the aligned axes of the driving tool, security screw, and a corresponding mounting nut;

Fig. 3 is a similar cross section to Fig. 2 showing the head of a security screw engaged with a driving tool according to one embodiment of the invention; and

Fig. 4 is a schematic cross-section through a second embodiment showing installation on a workpiece.

In the embodiment of Figs 1-3, a security screw 1 is provided having a conventional threaded shank portion 2 and a head portion 3. The head portion is characterised by having a circular profile with a cylindrical peripheral wall 4 and a smooth crown 5 without any tool engagement slots, recesses or other profile in contrast to a conventional screw. The crown 5 is typically flat, merging into the cylindrical side wall 4 by way of a rounded shoulder 6.

The screw is driven into place e.g. by engaging with a mounting nut 7 having a female thread 8 by way of a driving tool 9 having a shank portion 10 adapted to be rotated by a suitable implement such as a power drill 11. To this end, the shank 10 of the driving tool is engageable in the chuck 12 of the power tool in the well known manner.

The driving tool further comprises a cup portion 13 incorporating a cylindrical recess 14 coaxial with the shank 10.

The recess 14 is sized and shaped to fit over the head portion of a screw as will be explained with reference to Figure 3.

The recess in the cup portion 13 has a cylindrical side wall 14 immediately adjacent the mouth 15 of the recess transitioning into an inwardly curved shoulder portion 16 adapted to engage and bear against the shoulder portion 6 of the screw 1. The base of the

cylindrical recess is deeper at its centre portion 17 than at the shoulder portion 16 so that the centre of the recess does not bear against the flat crown 5 of an engaged screw. To this end the base portion is typically a shallow conical surface in configuration.

In use, when it is desired to fasten a component in place in a secure manner, the component is aligned where desired and the security screw 1 offered up to the mounting nut 7 and rotated to a "finger tight" engagement by the operator.

The cup portion of the driving tool is then located over the head of the security screw and force exerted through the power tool 11 as shown by arrows 18 (Fig. 1) forcing the recess in the cup portion of the driving tool into contact with the head of the security screw. The driving tool is then rotated by the power drill 11, in turn rotating the head of the screw by frictional engagement between the screw head and the cup of the driving tool, until the screw is firmly in place.

It is a particular feature of the security screw that the screw can be removed at any time by authorised personnel having a suitable driving tool, by engaging the tool as previously described and rotating the drill in an anti-clockwise direction to undo the screw. In this sense the security screw according to the invention is quite different from known prior art types of security screws which have "one way" screwdriver slots or ramps incorporated in the head of the screw.

Although the operation of the security screw will work to some degree with a wide range of materials used for both the screw and the driving tool, it has been found that for an efficient and consistent operation the head of the screw and the cup portion of the driving tool should be made of the same materials. In practice this normally means that the entire security screw and driving tool are formed from the same material. The material is typically a metal and it is believed that the invention will work

with a wide range of metals such as brass or black steel, but has been found particularly effective when both the screw and the driving tool are manufactured from austenitic stainless steel.

It is quite common to manufacture stainless steel screws from austenitic stainless steel such as 304 or 316 stainless steel and such screws are both tough in use and corrosion resistant. The screws are commonly made by the so-called "cold heading process".

By manufacturing the security screws according to the invention by a similar process, but without any tool engagement slots or recesses, it is relatively simple and inexpensive to provide a corresponding driving tool made from an identical material e.g. from 304 or 316 stainless steel.

By matching the materials in the security screw and the driving tool in this manner, and by providing a frictional engagement between the shoulder of the screw and the corresponding shoulder in the recess of the cup portion, it has been found that an effective friction drive can be provided which enables a screw to be fastened to a desired torque which will make it extremely difficult for unauthorised removal of the screw due to the smooth nature of the crown of the screw which does not provide any surfaces for engagement with a conventional tool such as a screwdriver or allen key and which furthermore is difficult to grip using pliers or the like. A screw so fastened, can however be readily removed by an authorised user having a driving tool made according to the invention.

Fig. 4 shows a particularly advantageous and enhanced embodiment where extra protection against an unauthorised unscrewing of the screw is required. Like parts have been given like reference numerals. In this embodiment a significant extra component is a generally part conical washer 20 through which the screw shank 2 fits, the washer having typically a flat base surface 21 for abutting a workpiece 22, a central cylindrical recess

23 for accommodating the head portion 4 of the screw 1 and a part conical outer surface 24 which terminates in a lip 25 upstanding above the top of the crown of the screw.

Preferably the washer 20 is a relatively hard material such as tool steel suitably plated to resist corrosion and such a hardened steel resist cutting with conventional tools such as hacksaws and the washer thus enshrouds the head of the screw to prevent access with grippers or other ordinary tools.

Fig. 4 shows schematically an installed situation where a workpiece comprises an outer sheet of material 22 and an overlapped inner sheet of material 26 with a lined aperture for accommodating the shank 2 of the screw and a nut such as a capped nut 7 is provided on the inner surface of the sheet 26.

In this embodiment the driving tool 30 has a shank 31 for mounting in an electric drill conventionally and a head portion 32 which has an outer circular profile substantially the same as the head of the screw so that its leading edge portion can extend below the upstanding lip 25 and into the recess 23. The interior profile of the driving tool includes a concave shoulder 33 which is complementary to the curved shoulder on the edge of the crown of the screw. Typically the sectional shape is part circular and the curve commences substantially at the junction of the shoulder with the outer cylindrical profile.

The invention which will be claimed will be any one of the novel arrangements either singly or in any combination and may include the following:

1. A security screw having a head portion and a threaded shank portion, and a complementary washer which fits on the screw and has an upstanding collar portion which, in use, surrounds the head portion to prevent access to the periphery of the head portion with tools for unscrewing the screw, the screw head portion having a circular profile about the axis of the shank portion and a smooth crown without any tool engagement discontinuities such that torque may be applied to the screw through a driving tool having a screw engagement portion the exterior profile of which is circular and substantially of the same diameter as the head portion of the screw and an interior profile which is complementary to a portion of the profile of the smooth crown.

2. A security screw arrangement as defined in clause 1 above and wherein the smooth crown has a smoothly rounded shoulder defining an edge surface portion of the crown and the shoulder is adapted to be engaged frictionally by a concave complementary portion of the driving tool.

3. A security screw as defined in clause 1 or clause 2 above, and wherein the washer has an inner edge portion adapted to extend axially above the top of the crown of the screw and the washer is of a relatively hard material to resist cutting of the washer and access to the head portion with a tool such as a hacksaw.

4. A method of installing or connecting components using a screw in a manner to resist unscrewing, the method comprising using a security screw and washer as defined in any one of the above clauses and using a driving tool to apply torque to the screw by entering engagement of an interior surface of the driving tool which is

complementary to a portion of the profile of the smooth crown.

5. A security screw comprising a threaded shank portion and a head portion, the head portion being characterised by having a circular profile about the axis of the shank portion and a smooth crown without any tool engagement slots or recesses.

6. A driving tool for a predetermined security screw of the type comprising a threaded shank portion and a head portion, the head portion of the security screw being characterised by having a circular profile about the axis of the shank portion and a smooth crown without any tool engagement slots or recesses, the driving tool comprising a shank portion adapted to be rotated by a suitable implement and a cup portion incorporating a recess coaxial with the shank portion, the recess being sized and shaped to fit over the head portion of the screw so as to provide a friction drive between the cup and an engaged screw when the driving tool is rotated by the implement.

Dated this 24th day of May 1999

**GOODCART PTY LIMITED**

By their Patent Attorneys

GRIFFITH HACK

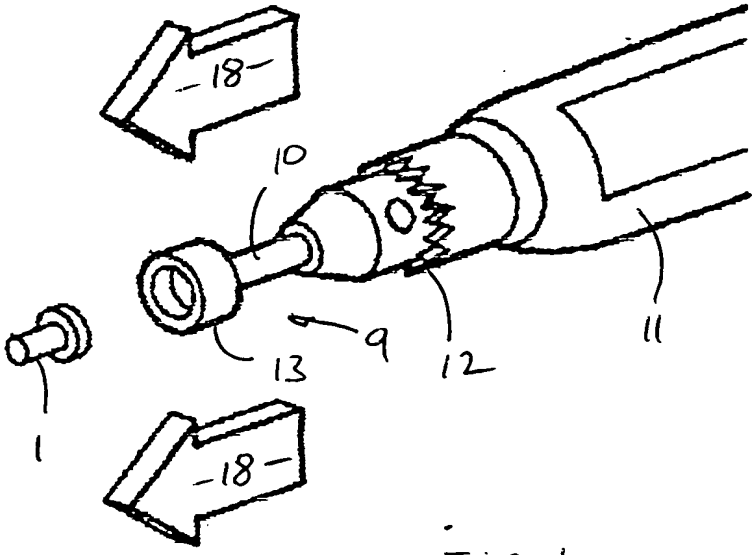


FIG 1

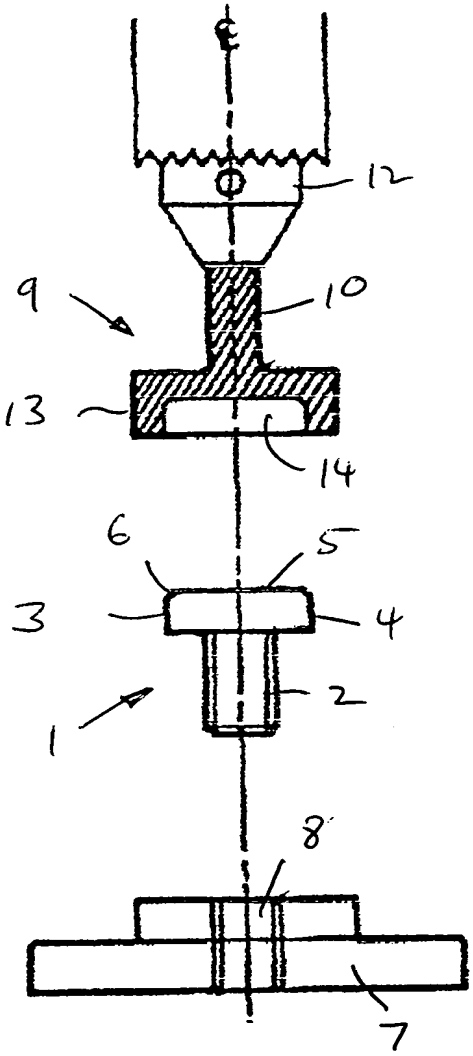


FIG 2

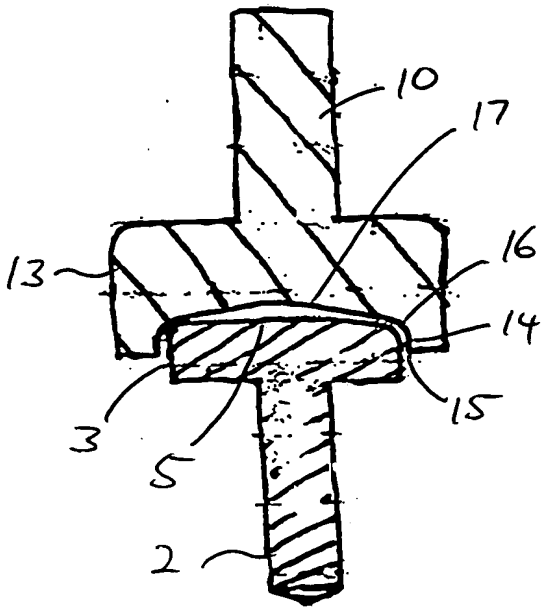


FIG 3

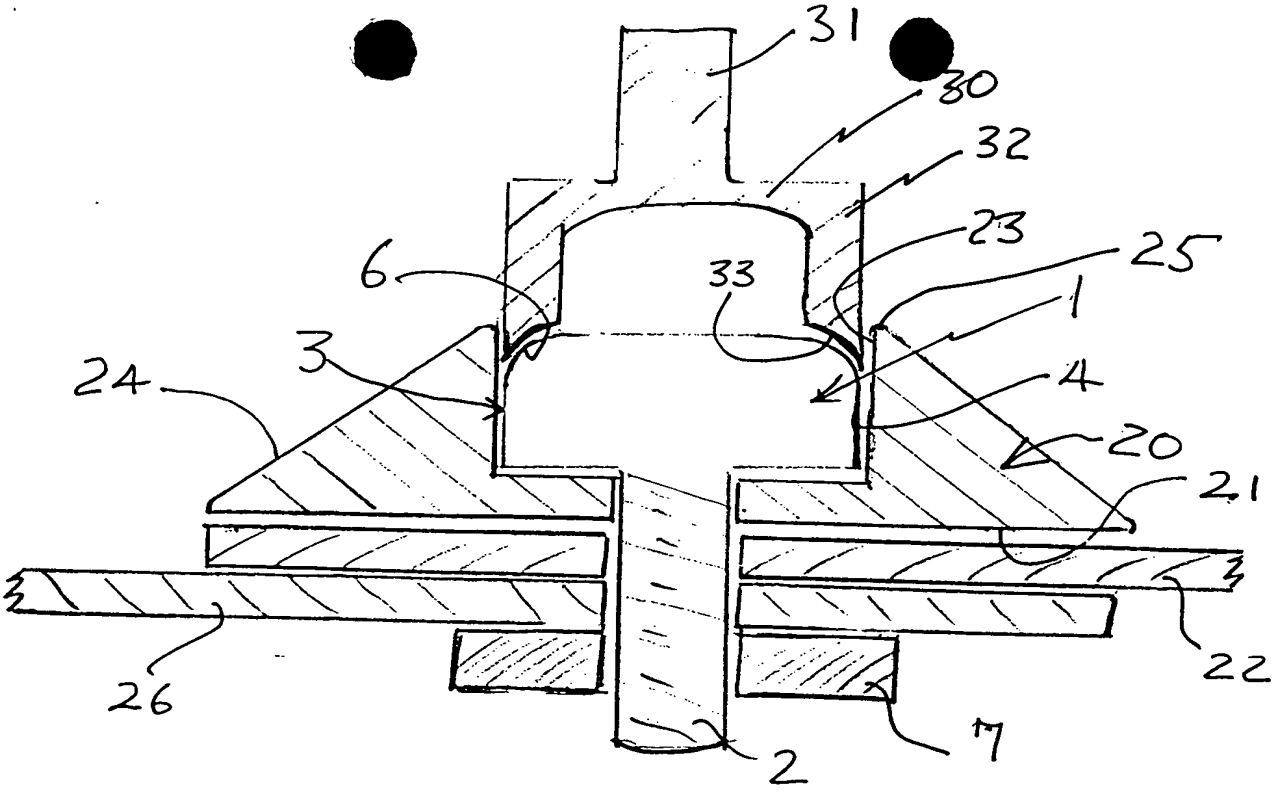


FIG 4